

What is claimed is

- 1 1. A program execution apparatus that determines an
2 execution sequence of tasks and executes the tasks according
3 to the execution sequence, each task being given a target
4 completion time before which execution of the task is to be
5 completed, the program execution apparatus comprising:
 - 6 a storing unit operable to store at least one identifier
7 of at least one task that is already in existence, at a memory
8 position therein determined based upon a plurality of types
9 of priorities set for the task, the plurality of types of
10 priorities having a hierarchical relationship;
 - 11 a receiving unit operable to receive an identifier of
12 a new task and a plurality of types of priorities set for
13 the new task;
 - 14 a writing unit operable to write the identifier received
15 by the receiving unit, at a memory position in the storing
16 unit determined based upon the plurality of types of priorities
17 received by the receiving unit; and
 - 18 a determining unit operable to determine an execution
19 sequence of the tasks whose identifiers are stored in the
20 storing unit, according to an arrangement sequence of the
21 identifiers in the storing unit.

- 1 2. The program execution apparatus of Claim 1, wherein

2 a first-type priority and a second-type priority are
3 set for each task as the plurality of types of priorities,
4 the first-type priority being a target completion time before
5 which execution of the task is to be completed, the second-type
6 priority being lower in a hierarchy than the first-type
7 priority,

8 the storing unit stores a plurality of groups each
9 including identifiers of tasks for which a same target
10 completion time is set as a first-type priority, the plurality
11 of groups being arranged at memory positions in the storing
12 unit in an arrangement sequence determined in an order of
13 a target completion time set for each group, the identifiers
14 of the tasks in each group being arranged at memory positions
15 in each group in the storing unit in an arrangement sequence
16 determined based upon a second-type priority set for each
17 task in the group,

18 the receiving unit receives the identifier of the new
19 task, and a target completion time as a first-type priority
20 and a second-type priority that are set for the new task,

21 the writing unit writes the received identifier, at the
22 memory position in the storing unit determined based upon
23 the received second-type priority in a group including
24 identifiers of tasks for which a first-type priority that
25 is the same as the received first-type priority is set, and

26 the determining unit determines the execution sequence

27 of the tasks whose identifiers are stored in the storing unit,
28 according to the arrangement sequence of the identifiers in
29 the storing unit determined based upon a first-type priority
30 and a second-type priority set for each task.

1 3. The program execution apparatus of Claim 2, wherein
2 the storing unit stores, for a beginning group that
3 includes identifiers of tasks for which a target completion
4 time closest to a present time is set as a first-type priority
5 and that is arranged at a beginning of the arrangement sequence
6 of the plurality of groups, the closest target completion
7 time as the first-type priority, and stores, for each of groups
8 that follow the beginning group in the arrangement sequence,
9 a time period between (a) a target completion time set for
10 tasks whose identifiers are included in the group and (b)
11 a target completion time set for tasks whose identifiers are
12 included in a group that precedes the group in the arrangement
13 sequence, and

14 the writing unit compares the target completion time
15 received by the receiving unit with the closest target
16 completion time, and (i) when finding a match, writes the
17 received identifier, at the memory position in the storing
18 unit determined based upon the received second-type priority
19 in the beginning group, and (ii) when not finding a match,
20 further compares, for each of the groups that follow the

21 beginning group, (c) the target completion time received by
22 the receiving unit with (d) a time at which the time period
23 stored for the group elapses from a target completion time
24 set for a group that precedes the group in the arrangement
25 sequence, and when finding a match, writes the received
26 identifier at the memory position in the storing unit
27 determined based upon the received second-type priority in
28 the group.

1 4. The program execution apparatus of Claim 2, wherein
2 a lowest value of a first-type priority is a maximum
3 value that can be expressed by a predetermined bit sequence
4 constituting a target completion time,
5 the storing unit stores a last group including
6 identifiers of tasks for which a target completion time
7 constituted by a predetermined bit sequence expressing the
8 maximum value is set, at a memory position that is a last
9 of the arrangement sequence of the plurality of groups,
10 determined based upon the target completion time,
11 the receiving unit receives the identifier of the new
12 task, and the target completion time constituted by the bit
13 predetermined sequence expressing the maximum value and the
14 second-type priority that are set for the new task, and
15 the writing unit writes the received identifier, at the
16 memory position in the storing unit determined based upon

17 the received second-type priority in the last group.

1 5. The program execution apparatus of Claim 2, wherein
2 the storing unit further stores, for each group, a total
3 execution time period that is predicted to take to execute
4 all tasks whose identifiers are included in the group,

5 the receiving unit further receives an execution time
6 period that is predicted to take to execute the new task,
7 and

8 the program execution apparatus further includes a
9 judging unit operable to judge whether a time at which a time
10 period obtained by adding the total execution time period
11 and the execution time period received by the receiving unit
12 elapses from a present time is before the target completion
13 time set for the new task, and when judging negatively, output
14 a reject signal indicating to reject execution of the new
15 task,

16 wherein when the judging unit judges affirmatively, the
17 writing unit writes the received identifier, at the memory
18 position in the storing unit determined based upon the received
19 second-type priority in a group including identifiers of tasks
20 for which a first-type priority that is the same as the received
21 first-type priority is set.

1 6. The program execution apparatus of Claim 5, wherein

2 the judging unit selects one of groups that follow a
3 group in the arrangement sequence of the plurality of groups,
4 and judges whether a time at which a total execution time
5 period for the selected group elapses from a present time
6 is before a target completion time set for tasks whose
7 identifiers are included in the selected group, the judging
8 unit repeating the selection and judgment processes on each
9 of the following groups, and

10 when the judging unit judges affirmatively for all of
11 the following groups, the writing unit writes the received
12 identifier, at the memory position in the storing unit
13 determined based upon the received second-type priority in
14 a group including identifiers of tasks for which a first-type
15 priority that is the same as the received first-type priority
16 is set, and

17 when the judging unit judges negatively for any of the
18 following groups, the writing unit outputs a reject signal
19 indicating to reject execution of the new task.

1 7. The program execution apparatus of Claim 1, wherein
2 a first-type priority and a second-type priority are
3 set for each task, the first-type priority being a value
4 obtained by multiplying predetermined time-units of a target
5 completion time set for the task by an integer, the second-type
6 priority being a value of a remaining time-unit of the target

7 completion time that is a smaller unit than the predetermined
8 time-units,

9 the storing unit stores a plurality of groups each
10 including identifiers of tasks for which a same first-type
11 priority is set, the plurality of groups being arranged at
12 memory positions in the storing unit in an arrangement sequence
13 determined based upon a first-type priority set for each group,
14 the identifiers of the tasks in each group being arranged
15 at memory positions in the storing unit in an arrangement
16 sequence determined based upon a second-type priority set
17 for each task in the group,

18 the receiving unit receives the identifier of the new
19 task, and a first-type priority and a second-type priority
20 that are set for the new task,

21 the writing unit writes the received identifier, at a
22 memory position in the storing unit determined based upon
23 the received second-type priority in a group including
24 identifiers of tasks for which a first-type priority that
25 is the same as the received first-type priority is set, and

26 the determining unit determines the execution sequence
27 of the tasks whose identifiers are stored in the storing unit,
28 according to the arrangement sequence of the identifiers in
29 the storing unit determined based upon a first-type priority
30 and a second-type priority set for each task.

1 8. A task management method for use in a program execution
2 apparatus that determines an execution sequence of tasks and
3 executes the tasks according to the execution sequence, each
4 task being given a target completion time before which
5 execution of the task is to be completed, the program execution
6 apparatus including a storing unit operable to store at least
7 one identifier of at least one task that is already in existence,
8 at a memory position therein determined based upon a plurality
9 of types of priorities set for the task, the plurality of
10 types of priorities having a hierarchical relationship,
11 the task management method comprising:
12 a receiving step of receiving an identifier of a new
13 task and a plurality of types of priorities set for the new
14 task;
15 a writing step of writing the identifier received in
16 the receiving step, at a memory position in the storing unit
17 determined based upon the plurality of types of priorities
18 received in the receiving step; and
19 a determining step of determining an execution sequence
20 of the tasks whose identifiers are stored in the storing unit,
21 according to an arrangement sequence of the identifiers in
22 the storing unit.

1 9. A task management program for use in a program
2 execution apparatus that determines an execution sequence

3 of tasks and executes the tasks according to the execution
4 sequence, each task being given a target completion time before
5 which execution of the task is to be completed, the program
6 execution apparatus including a storing unit operable to store
7 at least one identifier of at least one task that is already
8 in existence, at a memory position therein determined based
9 upon a plurality of types of priorities set for the task,
10 the plurality of types of priorities having a hierarchical
11 relationship,

12 the task management program comprising:

13 a receiving step of receiving an identifier of a new
14 task and a plurality of types of priorities set for the new
15 task;

16 a writing step of writing the identifier received in
17 the receiving step, at a memory position in the storing unit
18 determined based upon the plurality of types of priorities
19 received in the receiving step; and

20 a determining step of determining an execution sequence
21 of the tasks whose identifiers are stored in the storing unit,
22 according to an arrangement sequence of the identifiers in
23 the storing unit.

1 10. A task management program recorded on a
2 computer-readable recording medium for use in a program
3 execution apparatus that determines an execution sequence

4 of tasks and executes the tasks according to the execution
5 sequence, each task being given a target completion time before
6 which execution of the task is to be completed, the program
7 execution apparatus including a storing unit operable to store
8 at least one identifier of at least one task that is already
9 in existence, at a memory position therein determined based
10 upon a plurality of types of priorities set for the task,
11 the plurality of types of priorities having a hierarchical
12 relationship,

13 the task management program comprising:

14 a receiving step of receiving an identifier of a new
15 task and a plurality of types of priorities set for the new
16 task;

17 a writing step of writing the identifier received in
18 the receiving step, at a memory position in the storing unit
19 determined based upon the plurality of types of priorities
20 received in the receiving step; and

21 a determining step of determining an execution sequence
22 of the tasks whose identifiers are stored in the storing unit,
23 according to an arrangement sequence of the identifiers in
24 the storing unit.

1 11. A mobile telephone that determines an execution
2 sequence of tasks and executes the tasks according to the
3 execution sequence, each task being given a target completion

4 time before which execution of the task is to be completed,
5 the mobile telephone comprising:
6 a storing unit operable to store at least one identifier
7 of at least one task that is already in existence, at a memory
8 position therein determined based upon a plurality of types
9 of priorities set for the task, the plurality of types of
10 priorities having a hierarchical relationship;
11 a receiving unit operable to receive an identifier of
12 a new task and a plurality of types of priorities set for
13 the new task;
14 a writing unit operable to write the identifier received
15 by the receiving unit, at a memory position in the storing
16 unit determined based upon the plurality of types of priorities
17 received by the receiving unit; and
18 a determining unit operable to determine an execution
19 sequence of the tasks whose identifiers are stored in the
20 storing unit, according to an arrangement sequence of the
21 identifiers in the storing unit.